



DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
WATER QUALITY MONITORING AND ASSESSMENT SECTION
WATERSHED INFORMATION SHEET

Missouri River and Northwestern Tribs Basin – 10240001,10240004, 10240005 and 10240011

Basin Description

This basin encompasses the Missouri River from the Iowa state line to the confluence with the Kansas River in Kansas City, and all tributary streams on the east side of the Missouri except the Nodaway and Platte rivers. The Missouri portion of the basin has an area of 1,452 square miles. The major tributaries include Tarkio River, Rock, Little Tarkio, Squaw and Bee creeks. The lower two miles of the Nishnabotna River lies in the extreme northwest corner of this basin. The largest lakes are natural ox-bow lakes lying in the Missouri floodplain. These include Big Lake (625 acres), Lake Contrary (193 acres), Sugar Lake (317 acres) and Bean Lake (420 acres). The main pool at Squaw Creek National Wildlife Refuge is 615 acres in size, but is a shallow manmade impoundment that periodically contains very little water.

Average annual rainfall ranges from 34 inches in the northern part of the basin to 38 inches in the south. Stream flow statistics for the basin are shown in Table 1.

Table 1. Stream Flow Statistics for Missouri River and Northwestern Tributaries Basin

Stream/Location	Wtrshe d. Area (sq.mi.)	Period Of Record	Flow (cfs)				
			90 th Percentile *	Mean	Median **	10 th Percentile ***	7Q10 Low Flow+
Missouri R. nr. Rulo,Nb.	414,900	1949-2004	66,300	41,880	38,400	19,100	
Squaw Cr. nr. Mound City	62.7	2000-2004	38	18.1	7.9	1.7	
Missouri R. at St.Joseph	420,100	1928-2004	72,200	46,190	41,600	21,700	
W. Tarkio Cr. nr. Westboro	105	1934-39					0.0
Tarkio R. nr. Fairfax	508	1922-72					0.8
L. Tarkio R. nr. Mound City		1962-65 1967-70					0.2
Mill Creek at Oregon	4.9	1952-72					0.0

*Flow is less than this amount 90 percent of the time

**Flow is less than this amount 50 percent of the time

***Flow is less than this amount 10 percent of the time

+ The lowest average seven consecutive day flow that occurs with a recurrence interval of 10 years.

The basin lies within the Deep Loess Hills portion of the Dissected Till Plains physiographic province. The land is a mixture of hills and plains. Sixty percent of the land is row crop, 22 percent is pasture and hay fields 13 percent forest, 2 percent urban and 2 percent wetland or water.

Except for limited areas where streams may have incised Pennsylvanian aged rock, the surface of the basin is glacial till overlain by loess. Glacial till is a mostly unsorted mixture of clay, sand, gravel and rock debris created and pushed southward into Missouri by the great glacial ice sheets. Loess is a windblown silt deposit. Depth of the till is highly variable but is generally less than 200 feet. Loess deposits in northwestern Missouri are the deepest in the state and run from 10 to more than 30 feet in depth. Cyclical (repetitive) deposits of sandstone, siltstone, shale, limestone and coal of Pennsylvanian age underlie these glacial deposits.

The presence of the clayey till and the underlying shale and coal beds insure that there is very little movement of water to the subsurface. Most water movement in the basin is through the surface stream network. Water that reaches the subsurface will resurface locally when a stream valley incises a confining aquatard (an impermeable layer). There are three small springs of note in basin. None of the springs sustain flow during dry weather. Since very little water infiltrates to the subsurface, streamflow can be very high during wet weather. For the same reason, base flows, streamflow sustained only by the re-emergence of groundwater into the stream, are very low during the intervening dry periods.

Water Quality Concerns

Acceptable water quality is defined by Missouri's Water Quality Standards [<http://www.sos.mo.gov/adrules/csr/current/10csr/10c20-7a.pdf>] . Streams or lakes that do not meet these standards are considered "impaired." They may not be fit for certain uses such as swimming, drinking water supply or protection of fish and other aquatic life. Waters are considered to be "affected" rather than "impaired" if water quality changes are less serious and state standards are not exceeded. These standards also list more than 3,600 classified streams and more than 400 classified lakes in the state. A classified stream is one that is either a permanently flowing stream or one that may stop flowing in dry weather but still maintains large pools of water that support aquatic life. Unclassified streams are small tributaries to classified streams. They typically have flowing water only during wet weather and are dry for the remainder of the year.

Water Quality in Prairie Streams

<http://www.dnr.mo.gov/env/wpp/watersheds/info/wq-prairie-str.pdf>

Aquatic Habitat in Prairie Streams

<http://www.dnr.mo.gov/env/wpp/watersheds/info/aquatic-hab-prairie-str.pdf>

Point Source Pollution

Point source pollution is a discharge of wastewater from a single location such as a wastewater treatment plant. Wastewater treatment plants can serve industries, small businesses, subdivisions, mobile home parks, apartment complexes, or entire cities.

Wastewater from residential sources such as subdivisions, apartments and mobile home parks is often referred to as “domestic wastewater.” It primarily contains treated human wastes, food wastes and detergents. The primary pollutants of concern in domestic wastewater are the amount of organic matter, which is commonly reported as Biological Oxygen Demand (BOD), suspended solids and ammonia. Industrial and commercial wastewater can be more complex and may contain, in addition to domestic wastes, heavy metals or man-made organic chemicals that can be potentially toxic. Discharges from most municipal wastewater treatment plants are usually a mixture of domestic and industrial/commercial wastewater. Most wastewater plant discharges are also typically high in nitrogen and phosphorus, two elements that act as fertilizers and can cause excessive algae growth in waters receiving these discharges.

There are 34 permitted domestic or industrial/commercial point sources that discharge a combined 21.74 million gallons per day (mgd) of treated wastewater into the waters of the basin. The largest discharge in the basin is the 19 mgd discharge from the St. Joseph municipal wastewater treatment plant. There are 441 miles of classified streams in the basin, 1.2 miles of which (less than one percent) is known to be affected or impaired by point source wastewater discharges. There are 7.5 miles of known impacts from wastewater discharges to unclassified streams in the basin. Two discharges, Exide Corporation, which is a secondary lead recovery plant, and the Savannah municipal wastewater plant, are the only facilities that affect more than 0.5 miles of receiving stream.

The southernmost portion of this basin lies in southern Platte County and includes the rapidly urbanizing area around Parkville and Platte Woods in the northern portion of the Kansas City metro area. The department will stress the need to extend sanitary sewers throughout this area and provide wastewater treatment at a few large centralized plants.

Wastewater Treatment

<http://www.dnr.mo.gov/env/wpp/watersheds/info/wastewater-treatment.pdf>

Nonpoint Source Pollution

Nonpoint source pollution occurs when pollutants enter bodies of water at points that are not well-defined and stable. Examples include the erosion of sediments or the entrance of polluted surface runoff or groundwater into lakes and streams. Locations of nonpoint source pollution are often widely dispersed and are difficult to identify or control. In the Missouri River and Northwest Tributaries basin, the most serious nonpoint problem is degradation of aquatic habitat. A total of 348 miles (79 percent) of classified streams in the basin are considered to have degraded aquatic habitat. The prevalence of highly erosive loess soils and the large amount of row crop agriculture in the basin result in some of the highest soil erosion rates in Missouri and high levels of sediment deposition in streams. The quality of aquatic habitat is further impaired by removal of wooded

riparian vegetation, and by the channelization, or straightening, of streams. Channelization has occurred in 161 miles (36 percent) of streams in the basin.

Storm water runoff in the Midwest can also carry significant amounts of fertilizers, animal wastes, and pesticides into streams.

Groundwater can also be affected by nonpoint source pollution. In northern and western Missouri, some public water supplies and many private water supplies come from groundwater. Public groundwater supplies are routinely tested. Studies of water quality of private wells in northern and western Missouri show that about one third of wells exceed the drinking water standard for nitrate. And about 2 percent exceed drinking water standards for pesticides. This contamination is often caused by local land use practices or surface contamination of the wellhead and does not represent widespread contamination of the underground aquifer. Deeper aquifers are protected from surface contamination by impermeable strata.

During warm weather when stream flows are low, livestock tend to gather in and around streams. The wastes they leave in the water contribute to nuisance algae growths, low levels of dissolved oxygen and elevated levels of ammonia and bacteria.

Water Quality Management

The department achieves water quality management of point source pollutants through the issuance and enforcement of wastewater discharge permits. These permits limit the amount of pollutants that can be discharged. All point source wastewater dischargers must obtain a permit and adhere to its discharge limitations. All permits require at least a level of treatment equal to national wastewater treatment standards. In situations where these national treatment standards are not adequate to protect the streams or lakes receiving these wastewater discharges, stricter permit limits that do protect these waters are required. The permits require regular monitoring and reporting of discharge quality. The department also conducts regular inspection of wastewater treatment facilities and receiving waters.

Nonpoint source pollution is addressed through the state's nonpoint source management plan. This plan is a cooperative program between the Department of Natural Resources and other federal, state and local government agencies or organizations, local landowners and other interested citizens. The plan emphasizes addressing problems at the watershed level through the use of management practices that control nonpoint pollution. The most commonly supported practices are those that control soil erosion on agricultural and urban lands, improve quality and quantity of forage on grazing lands, protect riparian zones, and those that control runoff of animal manures, fertilizers and pesticides. The state nonpoint source management plan is a voluntary program that provides funds to help defray the cost of adopting management practices.

Since 1990, there have been 11 nonpoint source watershed projects in the basin. This project was funded by state sales tax money earmarked for soil and water conservation.

Table 3. Nonpoint Source Watershed Projects in the Nodaway River Basin

Watershed Name	County	Project Date	Watershed Size (Acres)	Acres Treated	Percent of Watershed Treated
Mission Creek	Platte	1987-92		1,452	
Kimsey Creek	Holt	1988-92		2,454	
Porter Creek	Holt	1990-94		2,866	
Mace Creek	Andrew	1991-95		2,996	
Contrary Creek	Buchanan	1992-96		2,595	
Kimsey Creek	Holt	1993-97		1,427	
N. Contrary Creek	Buchanan	1995-99		821	
Sugar Creek	Buchanan	1995-99		830	
Bear Creek	Platte	1994-99		7,575	
Davis Creek	Holt	-2000		2,370	
Squaw Creek	Holt	2001-05			

The Missouri Department of Natural Resources monitors water chemistry and aquatic invertebrate communities at many locations in Missouri. The department also tracks the quality of domestic, industrial and storm water discharges. These monitoring activities provide information on water quality problems, such as their specific location, pollutants, sources and possible solutions. This information guides the management activities the department takes to protect water quality in Missouri.

Web links

US Geological Survey

<http://mo.water.usgs.gov/>

Kansas City District Corps of Engineers

<http://www.nwk.usace.army.mil/>

US Environmental Protection Agency

<http://www.epa.gov/region7/water/index.htm>